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SPECIFICATION FOR *PAUSHTIK* WHEAT *ATTA*

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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SPECIFICATION FOR *PAUSHTIK* WHEAT *ATTA*

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(*Continued on page* 15)

Indian Standard

SPECIFICATION FOR
PAUSHTIK WHEAT *ATTA*

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 May 1984, after the draft finalized by the Nutritional Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Wheat *atta* is prepared in India by grinding whole wheat either in small stone mills or in larger mills using mechanical power or in large roller flour mills.

0.3 In an effort at nutritional upgrading, the Government of India for several years has subsidized the addition of a combination of edible groundnut proteins, vitamins and minerals to wheat *atta.* This operation was carried out in certain larger flour mills and a large quantity of the product was produced and marketed in the country. Presently, the product being marketed is termed *paushtik* wheat *atta*. In this standard, the use of other edible oil seed proteins has also been permitted. This standard is expected to help in exercising proper quality control in the manufacture of *paushtik* wheat *atta* of good quality under hygenic conditions.

0.4 An Indian Standard has been brought out on specification for wheat *atta* (IS : 1155-1968*). Separate standards on fortified and *paushtik* wheat *Maida* and barley powder and fortified wheat *atta* are also being simultaneously brought out.

NOTE — The *paushtik* variety contains higher percentage of proteins compared to the fortified variety, percentages of other contents, such as iron, calcium and vitamins, remaining the same.

0.5 While formulating this standard, due consideration has been given to the relevant Rules prescribed by the Government of India, under the *Prevention of Food Adulteration Act, 1954* and the *Standards of Weights and Measures (Packaged Commodities) Rules, 1977*. This standards is, however, subject to the restrictions imposed under these Acts wherever applicable.

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*Specification for wheat *atta* (*second revision*).

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for *paushtik* wheat *atta* hereafter termed PW *atta.*

2. REQUIREMENTS

2.1 The PW *atta* shall be prepared by thoroughly and uniformly blending suitable proportions of an edible protein source (up to 10 percent, *also see* Note 1) such as edible oilseed proteins, and calcium carbonate, iron, thiamine, riboflavin and niacin with wheat *atta* of good quality (*see* IS : 1155-1968†). It shall be in the form of powder having a characteristic taste and flavour. The product shall be free from rancidity and from insect, rodent or fungus infestation. It shall also be free from fermented, musty or other objectionable odour. It shall neither have any ingredients other than those specified nor any extraneous matter.

NOTE 1 — In the *Prevention of Food Adultration Rules 1955*, only the addition of groundnut flour is permitted in similar products. Till such time as the addition of other protein-rich flours is accepted by the Government of India, the granting of ISI Certification Mark shall be based on the existing requirements given under the provisions of the *Prevention of Food Adulteration Rules, 1955* (*see* 0·5).

NOTE 2 — The appearance, taste and odour shall be determined by sensory evaluation tests.

2.2 The edible protein flour(s) used for such blending shall conform to the following specifications:

a) Groundnut flour	IS : 4684-1975‡	or IS : 4875-1975§	
b) Soya flour	IS : 7835-1975‖	or IS : 7836-1975¶	or
c) Cotton seed flour	IS : 4876-1968**	IS : 7837-1975††	

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*Rules for rounding off numerical values (*revised*).

†Specification for wheat *atta* (*second revision*).

‡Specification for edible groundnut flour (expeller pressed) (*first revision*).

§Specification for edible groundnut flour (solvent extracted) (*first revision*).

‖Specification for edible medium-fat soya flour.

¶Specification for edible low-fat soya flour.

**Specification for edible cottonseed flour (solvent extracted) (*first revision*).

††Specification for edible full-fat soya flour.

d) Sesame flour IS : 6109-1971[*] or 6108-1971[†]

e) Coconut flour IS : 8664-1977[‡] or 8676-1977[§]

2.2.1 *Aflatoxin* — The PW *atta* shall not have an aflatoxin content of more than 30 µg/kg of the material, when tested according to the method prescribed in Appendix J of IS : 4684-1975[||].

2.2.2 *Urease Activity* — The PW *atta* shall not show a change in *p*H by more than 0·5, when determined by the method given in Appendix D of IS : 7837-1975[¶].

2.2.3 *Gossypol* — The PW *atta* shall not have a free gossypol content of more than 0·06 percent by mass and a total gossypol content more than 1·2 percent by mass, when tested by the methods given in Appendices A and B respectively.

2.3 The calcium carbonate used for blending PW *atta* shall be prepared chalk (popularly known as *creta preparata*) or dicalcium phosphate or tricalcium phosphate. The iron or iron salts should be such as to ensure high bio-availability of iron. The vitamins and the minerals shall be of pharmaceutical or food grade.

2.4 Hygienic Conditions — The PW *atta* shall be manufactured, packed, stored and distributed under hygienic conditions (*see* IS : 2491-1972[**]) in licensed premises.

2.5 The product shall also conform to the requirements given in Table 1.

3. PACKING AND MARKING

3.1 Packing — The pakages may preferably be of 100 g, 200 g, 500 g, 1 kg, 2 kg, 5 kg and thereafter, in multiples of 5 kg as desired by the purchaser.

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[*] Specification for edible sesame flour (expeller pressed).

[†] Specification for edible sesame flour (solvent extracted).

[‡] Specification for edible coconut flour (expeller pressed).

[§] Specification for edible coconut flour (solvent extracted).

[||] Specification for edible groundnut flour (expeller pressed) (*first revision*).

[¶] Specification for edible full-fat soya-flour.

[**] Code for hygienic conditions for food processing unit (*first revision*).

TABLE 1 REQUIREMENTS FOR *PAUSHTIK* WHEAT *ATTA*

(*Clause* 2.5)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO INDIAN STANDARDS)
(1)	(2)	(3)	(4)
i)	Moisture, percent by mass, *Max*	13·0	Appendix A of IS : 1155-1968*
ii)	Total ash (on dry basis), percent by mass, *Max*	2·75	Appendix B of IS : 1155-1968*
iii)	Acid insoluble ash (on dry basis), percent by mass, *Max*	0·20 (*see* Note 1)	Appendix C of IS : 1155-1968*
iv)	Gluten (on dry basis), percent by mass, *Min*	7·0	Appendix D of IS : 1155-1968*
v)	Total protein (N×6·25) (on dry basis) percent by mass, *Min*	12·5	IS : 7219-1973†
vi)	Crude fibre (on dry basis) percent by mass, *Max*	2·5	Appendix E of IS : 1155-1968*
vii)	Alcoholic acidity (as H_2SO_4), with 90 percent alcohol, percent by mass, *Max*	0·12	Appendix F of IS : 1155-1968*
viii)	Calcium, mg/100 g, *Min*	120 (*see* Notes 1 and 2)	Appendix F of IS : 1656-1969‡
ix)	Iron, mg/100 g, *Min*	5	
x)	Thiamine (as hydrochloride) mg/100 g, *Min*	0·25	IS : 5398-1969§
xi)	Riboflavin, mg/100 g, *Min*	0·5	IS : 5399-1969‖
xii)	Niacin, mg/100 g, *Min*	2·5	IS : 5400-1969¶

NOTE 1 — These values have been referred to the Central Committee for Food Standards for consideration. Till such time as these values are accepted by the Government of India, the granting of ISI Certification mark shall be based on the existing requirements given under the provisions of *Prevention of Food Adulteration Rules, 1955* (*see* **0.5**).

NOTE 2 — This is equivalent to 300 mg calcium carbonate.

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*Specification for wheat *atta* (*second revision*).

†Method for determination of protein in foods and feeds.

‡Specification for processed cereals weaning foods (*first revision*).

§Methods for estimation of thiamine (vitamin B_1) in foodstuffs.

‖Methods of estimation of riboflavin (vitamin B_2) in foodstuffs.

¶Methods of estimation of nicotinic acid (niacin) in foodstuffs.

3.1.1 For packages above 65 kg, unless otherwise agreed to between the purchaser and the supplier the material for packing shall be single sound A-twill or B-twill jute bags or DW-flour bags conforming to IS : 1943-1964*, IS : 2566-1965† and IS : 3984-1967‡, respectively.

3.1.2 The bags used for smaller packs may be polyethylene bags or polyethylene lined jute bags or any other suitable material as agreed to between the purchaser and the supplier.

3.1.3 The mouth of the bag shall be either machine stitched or hand stitched. If it is hand stitched, the mouth shall be rolled over and then stitched. The stitches shall be in two cross-rows with at least 14 stitches in each row for jute bags of 65 kg and above.

3.2 Marking — Each bag shall be suitably marked so as to give the following information:

a) Name of the material;

b) Name and address of the manufacturer;

c) Batch or code number;

d) Net mass; and

e) Any other details required under the *Standard of Weights and Measures (Packaged Commodities) Rules, 1977*, and *Prevention of Food Adulteration Act, 1954* and *Rules, 1955*.

3.2.1 All marking shall be applied on the bags in such a manner that the dye or ink does not penetrate into the material.

3.2.2 Each container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

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*Specification for A-twill jute bags (*revised*).

†Specification for B-twill jute bags (*revised*).

‡Specification for DW-flour bags.

4. SAMPLING

4.1 The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in IS : 5315-1978*.

5. TESTS

5.1 Tests shall be carried out as prescribed under **2.1, 2.2** to **2.2.3** and in the appropriate standards specified in col 4 of Table 1.

5.2 Quality of Reagents — Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS : 1070-1977†) shall be used where the use of water as a reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

APPENDIX A

(*Clause* 2.2.3)

DETERMINATION OF FREE GOSSYPOL

A-1. PRINCIPLE

A-1.1 Free gossypol (that is gossypol not bound by protein) is extracted by 70 percent aqueous acetone and determined by the colour developed with *p*-anisidine. The difference in absorbance read at 447 nm before and after reaction with *p*-anisidine, is proportional to the concentration of free gossypol.

A-2. APPARATUS

A-2.1 Mechanical Wrist Action Shaker

A-2.2 Photo-Electric Colorimeter — with a filter having a maximum transmittance between 440 to 460 nm or a spectrophotometer isolating a band at 447 nm.

A-2.3 Grinding Mill — a laboratory hammer mill capable of grinding to 1 to 2 mm particle size.

A-2.4 Solid Glass Beads — approximately 6 mm diameter.

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*Methods of sampling for milled cereals and pulses products (*first revision*).

†Specification for water for general laboratory use (*second revision*).

A-2.5 Conical Flask — 250-ml capacity, glass stoppered.

A-2.6 Pipettes, Volumetric — 1, 2, 3, 4, 5, 10, 15, 20, 25, 30, 35, 40 and 50 ml.

A-2.7 Flasks, Volumetric — 25-ml and 50-ml capacity.

A-2.8 Insulated Water-Bath — Thermostatically controlled to ±1°C, and capable of keeping the water at a gentle boil. For free gossypol determination the water-bath is adjusted to 60°C. Water-bath should be equipped with clamps to securely hold the volumetric flask immersed in water.

A-3. REAGENTS

A-3.1 70 Percent Aqueous Acetone (*v/v*) — 700 ml of redistilled acetone is diluted with 300 ml of distilled water.

A-3.2 95 Percent Ethyl Alcohol, Aldehyde-Free — Reflux 95 percent ethyl alcohol over potassium hydroxide and aluminium (10 g of potassium hydroxide plus 5 g of aluminium granules or dust per litre) for one hour and distil.

A-3.3 Glacial Acetic Acid

A-3.4 *p*-Anisidine — Dissolve about 40 g of technical grade *p*-anisidine in one litre of hot water at approximately 75°C. Add about 2 g of sodium sulphite and 20 g of active carbon or decolourizing carbon. Stir for about 5 minutes. Filter the mixture through a double layer of medium retentivity filter (Whatman No. 1 may be used) on a Buchner funnel under gentle suction. Refilter through the same paper if the filtrate is turbid. Leave the water-white filtrate in a refrigerator at 0 to 5°C overnight for crystallization. Filter the crystals of *p*-anicidine over a Buchner, and wash them with a minimum amount of cold water. Dry the crystals in a vacuum desiccator over phosphoric pentoxide or concentrated sulphuric acid overnight. Preserve in a brown bottle. Recrystallize the *p*-anisidine if the reagent blank gives an absorbance of more than 0·022.

A-3.5 *p*-Anisidine-Acetic Acid-Ethyl Alcohol Reagent — Dissolve 0·500 g of recrystallized *p*-anisidine in purified ethyl alcohol. Add one millilitre of glacial acetic acid and make up to 50 ml volume with the ethyl alcohol. Use 3 ml of this reagent for each determination. Since *p*-anisidine is not stable in solution, this reagent shall be made fresh each day.

A-3.6 Ethyl Alcohol-Acetic Acid Reagent — Dilute 1 ml of glacial acetic acid to 50 ml volume with purified ethyl alcohol. Use 3 ml of this reagent for each gossypol blank.

A-3.7 Standard Gossypol Solutions — Weigh accurately 25 mg of pure gossypol, or 27·9 mg of pure gossypol acetate in 70 percent aqueous acetone and make up to 200 ml with 70 percent aqueous acetone. This stock solution contains 0·125 mg of gossypol per millilitre. Dilute 2, 5, 10, 15, 20, 25, 30, 35 and 40 ml of this stock solution to 50 ml with 70 percent aqueous acetone. Two millilitres of each solution are used for determination of standard curve. Pure gossypol acetone is more stable than pure gossypole.

A-4. PROCEDURE

A-4.1 Grind about 50 g of the material to pass through an 1·00 mm IS Sieve [*see* IS : 460 (Part 1)-1978*] in hammer mill. Weigh sufficient quantity of the material to contain about 25 mg of free gossypol into a glass-stoppered 250-ml conical flask. This shall require 1·0 to 1·5 g for screw-pressed cottonseed cakes containing about 0·2 g or less of free gossypol. Cover the bottom of the flask with the glass beads, add 50 ml of 70 percent aqueous acetone by pipette. Stopper the flask and shake on a mechanical shaker for one hour at room temperature. The rate of shaking should be so adjusted that the material collecting around the top of the flask is constantly washed back into solution.

A-4.2 Filter through a dry Whatman No. 1 filter paper into a small glass-stoppered flask. Discard the first portion (about 10 ml) of the filtrate. Cover the funnel with a watch-glass to reduce evaporation. If necessary, gossypol may be determined in the filtrate the next day since gossypol is stable in aqueous acetone.

A-4.3 Pipette duplicate 2-ml aliquots of the filtrate into 25-ml volume flasks.

A-4.4 To one of the aliquots add 3 ml of ethyl alcohol acetic acid reagent and make up to volume with ethyl alcohol. This is the *gossypol blank.*

A-4.5 To the second 2-ml aliquot add 3 ml of the *p*-anisidine-acetic acid-ethyl alcohol reagent, and place in a water-bath (with the flask loosely stoppered) at 60°C for 30 minutes.

A-4.6 Simultaneously, to 2 ml of 70 percent aqueous acetone add 3 ml of *p*-anisidine-acetic acid-ethyl alcohol reagent and place in the water-bath as in **A-4.5** This is the *reagent blank.*

A-4.7 Remove the flasks from the water-bath, cool to room temperature, and make up to volume with 95 percent ethyl alcohol.

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*Specification for test sieves : Part 1 Wire cloth test sieves (*second revision*).

A-4.8 Prepare a solvent blank consisting of 2 ml of 70 percent aqueous acetone and 3 ml of acetic acid-ethyl alcohol reagent, made up to 25 ml volume with ethyl alcohol.

A-4.9 Determine the absorbance (optical density) of the reacted sample solution setting the spectrophotometer to zero absorbance (100 percent transmittance) with the reagent blank.

A-4.9.1 Determine the absorbance of the gossypol blank with the instrument set to zero with the solvent blank.

A-4.9.2 All absorbances shall be read at 447 nm.

A-5. PREPARATION OF STANDARD CURVE

A-5.1 Carry out the operations from **A-4.3** to **A-4.9.1** using 2-ml aliquots of each of the standard gossypol solutions (*see* **A-3.7**). Plot the values for gossypol concentration expressed as milligrams of gossypol in 25 ml volume against absorbance. For each gossypol concentration determine the factor, milligrams of gossypol in 25 ml volume against corrected absorbance and average the factors thus obtained for all the gossypol standards. When gossypol acetate is used, mg gossypol acetate × 0·896 2 = mg gossypol.

A-6. CALCULATION

A-6.1 Corrected absorbance $= Y_1 - Y_2$

where

Y_1 = absorbance of the reacted sample solution, and

Y_2 = absorbance of the gossypol blank.

A-6.2 Milligrams gossypol in sample aliquot = Corrected absorbance × Factor

$$\text{Free gossypol, percent by mass} = \frac{5 \times \text{mg free gossypol in sample aliquot}}{\left(\begin{array}{c}\text{Mass of sample}\\ \text{in grams}\end{array}\right) \times \left(\begin{array}{c}\text{Volume of sample}\\ \text{aliquot taken}\end{array}\right)}$$

NOTE 1 — The choice of sample aliquot (*see* **A-4.3**) depends upon the free gossypol content of the meal and the absorbance values obtained. For cottonseed products in the range of 0·01 to 0·05 percent free gossypol, a 5-ml aliquot is usually optimum. For products containing more free gossypol, a 2-ml aliquot is sufficient.

NOTE 2 — The reading of reagent blank against solvent blank cancels out any interfering colour developed by reaction of acetone with *p*-anisidine. Usually, the reagent blank has about 97 to 98 percent transmittance when measured against solvent alone. If the reagent blank shows less than 95 percent transmittance or an absorbance of more than 0·022, the *p*-anisidine shall be recrystallized again. The gossypol blanks shall read against the solvent and serve to correct for the extraneous colour which is present in cottonseed extracts.

NOTE 3 — For concentrations ranging from 0 to 0·2 mg of gossypol in 25 ml volume, a straight line is obtained on a spectrophotometer. On simpler photoelectric colorimeters, with filters, the straight line relationship is usually found for concentrations of gossypol ranging from 0 to 0·10 mg in 25-ml volume.

NOTE 4 — Where 95 percent ethyl alcohol is not available, 80 percent isopropyl alcohol may be substituted for it throughout the procedure.

NOTE 5 — For plant control operations, where rapid analysis is required, the extraction may be done in a Waring Blender using 100 ml of 70 percent aqueous acetone and blending the sample for 5 minutes. The extract is then filtered as usual and procedure thereafter followed as given above.

APPENDIX B

(*Clause* 2.2.3)

DETERMINATION OF TOTAL GOSSYPOL

B-1. PRINCIPLE

B-1.1 The term 'total gossypol' designates 'free gossypol', 'bound gossypol' and closely related pigments which after hydrolysis and reaction with an organic amine (*p*-anisidine or aniline) give a product identical spectrophotometrically with that obtained from pure gossypol and the same reagent. In this method, total gossypol is completely removed from meal in a 30-minute extraction during which gossypol is complexed with neutralized 3-amino-l-propanol in dimethyl formamide. The difference in absorption of aliquot portions of the extract before and after reaction with aniline serves as a measure of the total gossypol content, and allows proper correction for the background absorption of the extracts.

B-2. APPARATUS

B-2.1 Photoelectric Colorimeter — with a filter having a maximum transmittance in the vicinity of 440 nm or a spectrophotometer isolating a band at 440 nm.

B-2.2 Grinding Mill — a laboratory hammer mill capable of grinding to 1-2 mm particle size.

B-2.3 Pipettes, Volumetric — 1-, 2-, 4-, 6-, 8- and 10-ml.

B-2.4 Flasks, Volumetric — 25-, 50-, and 100-ml.

B-2.5 Insulated Water-Bath — thermostatically controlled to ± 1°C, and capable of keeping the water at a gentle boil. The water-bath should be equipped with clamps to securely hold the volumetric flasks immersed in water.

B-3. REAGENTS

B-3.1 *Iso*propyl Alcohol-Hexane Mixture — Mix 60 volumes of reagent grade *iso*propyl alcohol and 40 volumes of commercial hexane.

B-3.2 Complexing Reagent — Pipette 2 ml of 3-amino-l-propanol and 10 ml of glacial acetic acid into a 100-ml volumetric flask, cool to room temperature, and dilute to volume with dimethyl formamide (N-N-dimethyl formamide, redistilled between 152 to 153°C). This reagent is stable for one week after preparation.

B-3.3 Aniline — redistilled over zinc dust. Store in a refrigerator and redistil when the absorbance of the *reagent blank* exceeds 0·022.

B-3.4 Standard Gossypol Solutions — Weigh accurately 25 mg of pure gossypol or 27·9 mg of pure gossypol-acetate, dissolve in and make up to 50 ml volume with the complexing reagent. If exactly 25 mg of pure gossypol are used, the solution shall contain 0·5 mg/ml.

B-3.4.1 *Preparation of Calibration Curve* — Pipette 2, 4, 6, 8 and 10 ml of standard gossypol solution into 50-ml volumetric flasks. To each standard add sufficient complexing reagent to make up the total volume to 10 ml. Use 10 ml of the complexing reagent as a blank. Heat the flasks containing the standards and the blank in a boiling water-bath (100°C) for 30 minutes, cool and dilute to volume with the *iso*propyl alcohol-hexane mixture. Pipette, in duplicate, 2-ml aliquots of each diluted standard and of the blank into 25-ml volumetric flasks. Dilute one set of aliquots to volume with the *iso*propanol-hexane-mixture and reserve as *reference solutions*. To the other set of aliquots, add 2 ml of aniline, heat in a boiling water-bath for 30 minutes, cool to room temperature and dilute to volume with *iso*propyl alcohol-hexane mixture. Allow the flask to stand at room temperature for one hour after dilution and mixing. With a spectrophotometer, determine the absorbance of the reagent blank at 440 mµ using the diluted blank aliquot without aniline as a reference solution. Determine the absorbance of each gossypol standard reacted with aniline, using the appropriate diluted standard as reference solution. Subtract the absorbance of the reagent blank from that of each standard to obtain the corrected absorbance. Calculate the calibration factor by dividing the number of milligrams of gossypol in the 2-ml aliquot of each standard by the appropriate corrected absorbance. Average the factors for all the gossypol standards. When a photoelectric colorimeter is used, the factors shall probably vary with each concentration of gossypol in which case a calibration curve should be plotted and used.

B-4. PROCEDURE

B-4.1 Grind about 50 g of the material to pass through a 1·00-mm IS Sieve [*see* IS : 460 (Part 1) - 1978*] in a hammer mill. Take 0·20 g of the material in a 50-ml volumetric flask. Add 10 ml of the complexing reagent.

B-4.2 Use 10 ml of the complexing reagent as the reagent blank.

B-4.3 Heat both the sample and the blank in a boiling water-bath for 30 minutes, cool to room temperature, dilute to volume with isopropyl alcohol-hexane mixture and mix. Filter through Whatman No. 1 filter paper and collect the filtrate in a small glass-stoppered flask.

B-4.4 Pipette duplicate 2-ml aliquots of the filtered extract and of the reagent blank into 25-ml volumetric flasks.

B-4.5 Dilute one of the aliquots to volume with the isopropyl alcohol-hexane mixture and reserve as reference solutions.

B-4.6 To the other aliquot, add 2 ml of aniline, develop the colour and determine the corrected absorbance at 440 nm as outlined in **B-3.4.1**.

B-4.7 Determine the mg gossypol in the sample aliquot by means of the calibration curve on the calibration factor.

B-4.8 Total gossypol, percent

$$= \frac{5 \times \text{mg gossypol in sample aliquot}}{\left(\begin{array}{c}\text{Mass of sample in g used}\\ \text{for analysis}\end{array}\right) \times \text{Volume of aliquot}}$$

NOTE — 3-amino-1-propanol may be redistilled if coloured. Its boiling point is 188°C, and it may be conveniently distilled under water pump vacuum.

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*Specification for test sieves : Part 1 Wire cloth test sieves (*second revision*).

(*Continued from page* 2)

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